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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,282	07/09/2003	Martin Sorrells	AES 003-002	4806
7590	10/31/2005			EXAMINER HINZE, LEO T
Patrick H. McCollum PD Holdings (USA) Inc. Suite 1700 363 N. Sam Houston Parkway East Houston, TX 77060			ART UNIT 2854	PAPER NUMBER

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/618,282	SORRELLS ET AL.
	Examiner	Art Unit
	Leo T. Hinze	2854

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 11 July 2005.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-35 is/are pending in the application.
 4a) Of the above claim(s) 1-10 and 15-21 is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 11-14, 22 and 32-35 is/are rejected.
 7) Claim(s) 23-31 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 09 July 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20031023</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claims 11-14 and 22-25 in the reply filed on 11 July 2005 is acknowledged.

Claim Objections

2. Claims 22-31 are objected to because of the following informalities: claim 22 contains two steps labeled "c".

Appropriate correction is required.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the references "QT" and "OT" on page 6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional

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replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 11 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Driscoll et al., US 5,250,871 (Driscoll).

Driscoll teaches a quad compensated clock for use in a borehole system, said quad compensated clock comprising: (a) a quad compensated resonator comprising four oscillator crystals (10, Fig. 2); (i) electrically connected in series ("connected in series", col. 3, ll. 43-44) with their acceleration sensitivity vectors aligned (see alignment of 15, 20 and 25, Fig. 2), nominally one per quadrant, in a common plane, and (ii) configured in pairs so that maximum acceleration sensitivity vectors of oscillators comprising said pairs are in opposite directions ("each have two crystallographic axes that are in antiparallel relationship with each other", col. 3, ll. 17-18); and (b) oscillator circuitry cooperating with said quad compensated resonator (45, Fig. 3); wherein (c) outputs of said oscillator

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crystals in said quad compensated resonator are combined and input to said oscillator circuitry to form a quad compensated clock output with reduced sensitivity to acceleration (“acceleration sensitivity vector... is substantially reduced”, col. 3, ll. 39-41).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 12 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of applicant’s admission.

Driscoll teaches all that is discussed in the rejection of claims 11 and 32 above, except wherein said quad compensated resonator comprises oscillator crystals having a temperature stability of about .+- .20 parts per million over a temperature range of about 0 to 180 degrees Centigrade. Driscoll is silent as to the specific operating characteristics required for each oscillator.

Applicant’s admission teaches using known oscillators from Quartzdyne, Inc. (p. 9, l. 22).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll to select oscillators with temperature stability of about .+- .20 parts per million over a temperature range of about 0 to 180 degrees Centigrade, because a person having

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ordinary skill in the art would recognize that selecting the oscillator crystals with the desired operating characteristics for a particular application would be a matter of design choice.

8. Claims 13 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of Forrester, US 2002/0173284 A1 (Forrester).

Driscoll teaches all that is claimed as discussed in the rejection of claims 11 and 32 above, except wherein said quad compensated clock output is corrected, using a compensation algorithm resident in a processor cooperating with said clock, for: (a) crystal aging; (b) crystal hysteresis; (c) crystal warm-up; and (d) crystal short-term and long-term frequency stability characteristics.

Forrester teaches a reference oscillator that uses an algorithm to compensate the reference oscillator for aging, warm-up, frequency stability effects (p. 1, ¶ 13) and hysteresis (p. 5, ¶ 49). This algorithm allows low-cost oscillators to be used and to accurately generate reference signals despite initial tolerance, temperature, and aging effects (p. 1, ¶ 12).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll wherein said quad compensated clock output is corrected, using a compensation algorithm resident in a processor cooperating with said clock, for: (a) crystal aging; (b) crystal hysteresis; (c) crystal warm-up; and (d) crystal short-term and long-term frequency stability characteristics as taught by Forrester, because Forrester teaches that such an algorithm allows low-cost oscillators to be used and to accurately generate reference signals despite initial tolerance, temperature, and aging effects.

9. Claims 14 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll in view of Cecconi et al., US 20020060952 A1 (Cecconi).

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Driscoll teaches all that is claimed as discussed in the rejection of claims 11 and 32 above, including packaging (55, Fig. 3) for said quad compensated resonator and said cooperating oscillator circuitry.

Driscoll does not teach wherein said packaging comprises insulation to reduce sharp temperature fluctuations and thermal transient effects in said quad compensated resonator and said cooperating oscillator circuitry.

Cecconi teaches a device and method for seismic drill hole measuring, including an underground clock device (23, Fig. 5) with a quartz crystal (p. 3, ¶ 40) and thermal insulation (p. 3, ¶ 40). Such thermal insulation is advantageous in helping the clock survive the operating conditions at the bottom of a drill hole (p. 1, ¶ 3).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Driscoll to add insulation to reduce sharp temperature fluctuations and thermal transient effects in said quad compensated resonator and said cooperating oscillator circuitry as taught by Cecconi, because Cecconi teaches that thermal insulation is advantageous in helping the clock survive the operating conditions at the bottom of a drill hole.

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Driscoll.

Driscoll teaches a method for measuring time from within a borehole system, the method comprising; (a) providing a quad compensated clock, the said quad compensated clock comprising four oscillator crystals (10, Fig. 2); (b) configuring said oscillator crystals in each said quad compensated clock to a sensitivity vector of each said oscillator crystal to form a quad compensated resonator (see alignment of 15, 20 and 25, Fig. 2); (c) combining outputs of said oscillator crystals in said quad

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compensated resonator to form a quad compensated clock output (“connected in series”, col. 3, ll. 43-44); and (c) selecting said configuration and said combination of outputs of said oscillator crystals to reduce effects of acceleration (“acceleration sensitivity vector... is substantially reduced”, col. 3, ll. 39-41) upon said quad compensated clock output.

Driscoll does not teach providing an ensemble of quad compensated clocks.

It has been held that mere duplication of parts is not sufficient to patentably distinguish an invention over the prior art. See MPEP § 2144.44 (VI)(B).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to use as many of the devices of Driscoll as required, as a person having ordinary skill in the art would recognize that using more than one device could provide more outputs that could be advantageously used to provide more data and subsequently perform more and varied analysis of a drilling operation.

Allowable Subject Matter

11. Claims 23-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

a. Regarding claim 23, the prior art of record does not teach or render obvious a method for measuring time from within a borehole system having all of the steps and structure as claimed, including combining the outputs from multiple quad compensated clocks to yield an quad compensated

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ensemble crystal oscillator clock output exhibiting less frequency drift as a function of time than any one said quad compensated clock in said ensemble.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leo T. Hinze whose telephone number is (571) 272-2167. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Hirshfeld can be reached on (571) 272-2168. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leo T. Hinze
Patent Examiner
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26 October 2005



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